

8/10/2016

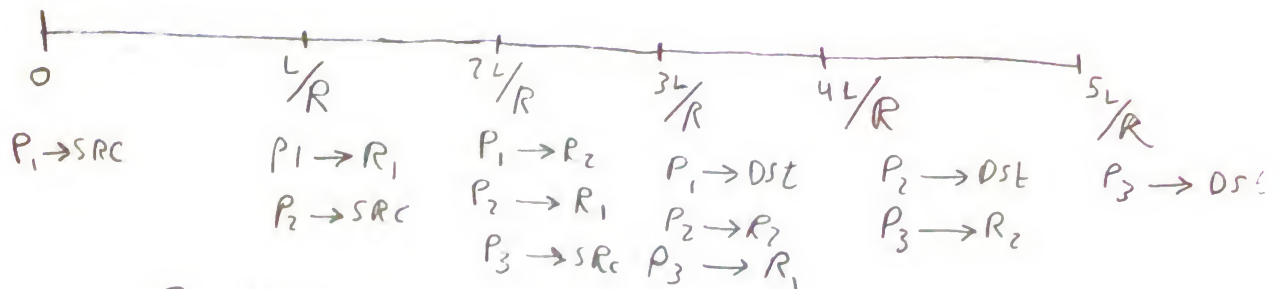
السبت

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سلسلة نظري [1]

## Sheet 1:-

P2:  $d_{\text{end-to-end}} = N \frac{L}{R}$



Generalize for (P) packets

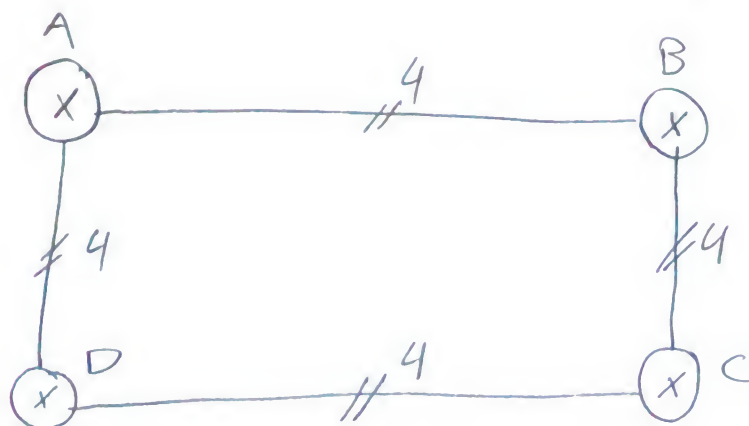
$$d = (N + P - 1) \frac{L}{R}$$

zero index  $\nearrow$

P3: a) Circuit switching, since it requires long time and sends at fixed rate.

b) No need for congestion control, since the data rate is less than the capacity.

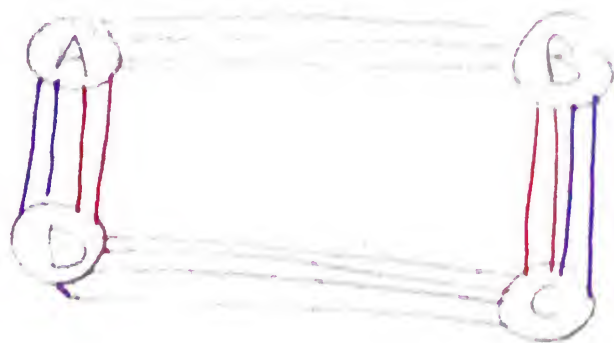
P4:



a)  $4 \times 4 = 16$  connection

b)  $8 \rightarrow 4$  ABC, 4 ADC

c)



2 ABC + 2 ADC  
2 BCD + 2 BAD

P5: a)



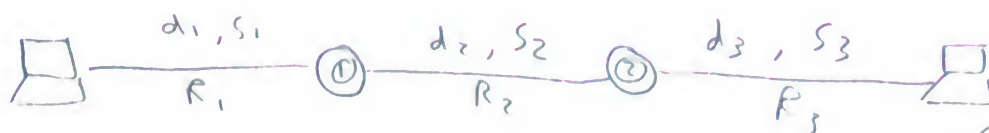
$$\begin{aligned} d_{\text{end-to-end}} &= 3d_{\text{proc}} + 2d_{\text{prop}} \\ &= 3 \times 12 \times 10 + 2 \times \frac{75000 \text{ m}}{100000 \text{ m/hr}} \\ &= 96 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{b) } d &= 3 \times 12 \times 8 + 2 \times \frac{75000 \text{ m}}{100000 \text{ m/hr}} \\ &= 94.8 \text{ min} \checkmark \end{aligned}$$

P6: [Report]

Page 72 in Reference

P10:



$$\begin{aligned} d_{\text{end-to-end}} &= d_{\text{proc}_1} + d_{\text{proc}_2} \\ &+ \underbrace{\frac{L}{R_1} + \frac{L}{R_2} + \frac{L}{R_3}}_{\text{Trans}} + \underbrace{\frac{d_1}{S_1} + \frac{d_2}{S_2}}_{\text{prop}} \end{aligned}$$

delays  $S_i$   
proc.  
trans.  
prop.

Suppose  $L = 1500 \text{ B} = 1500 * 8 \text{ bits}$

$$S_1 = S_2 = S_3 = 2.8 * 10^8 \text{ m/s}$$

$$R_1 = R_2 = R_3 = 2 \text{ Mbps}$$

$$d_{\text{proc}} = 3 \text{ msec}$$

Given  $d_1, d_2, d_3$

Substitute in the previous formula

$$d = 64 \text{ ms}$$

P11: [Report] Page 73 in Reference

P12:  $d_{\text{trans queue}} = \frac{nL}{R} + \frac{L-x}{R}$

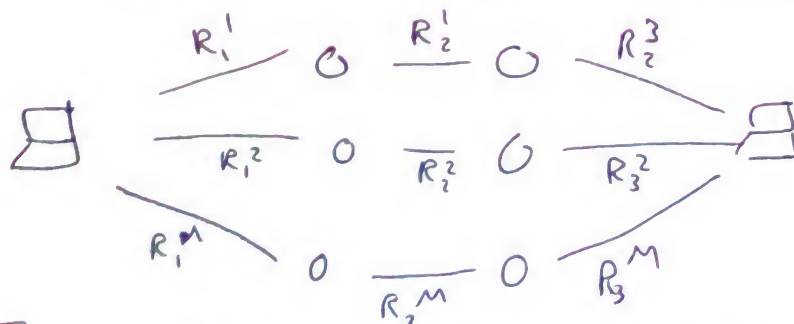
$$n=4, L=1500 * 8 \text{ bit}$$

$$R = 2 \text{ Mbps}, x = 750 * 8 \text{ bit}$$

$$d = 27 \text{ ms}$$

P20: Throughput =  $\min \{ R_s, R_c, R/m \}$

P21:



① Max Throughput =  $\max \left\{ \begin{aligned} &\min \{ R_1^1, R_2^1, \dots, R_N^1 \}, \\ &\min \{ R_1^2, R_2^2, \dots, R_N^2 \}, \\ &\dots, \min \{ R_1^M, R_2^M, \dots, R_N^M \} \end{aligned} \right\}$

②  $\sum_{K=1}^M \min \{ R_1^K, R_2^K, \dots, R_N^K \}$

Next Section :

Quiz (Theoretical)

P6, P11, P23, P24  $\Rightarrow$  Report